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(54) SYSTEM AND METHOD FOR REPRODUCING CONTINUOUS MEDIA STREAMS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an inexpensive and simple system capable of reducing degradation in the quality of continuous media streams to be reproduced even when the load of a transmission line gets light or heavy by successively reading and reproducing the contents of continuous media streams stored in a buffer part through a reproducing part.
SOLUTION: The contents of continuous media streams received through an I/F part 110 are stored in a buffer part 130. A reproducing part 150 successively reads and reproduces the contents of continuous media streams stored in the buffer part 130. Thennon-reproduced contents stored on a disk part 140 are read outwritten in an 'empty buffer' and reproduced. Thusthe reproduction of streams can be immediately restarted and in spite of whether the load of internet is light or heavythe degradation in the quality of reproduced media streams caused by instability on the transmission line of internet can be reduced.

CLAIMS

[Claim(s)]
[Claim 1]It is a system reproduced while receiving playback equipment receives a continuous-media stream which lets a transmission line pass and is transmitted from a sending setHave said sending set and a means to divide said continuous-media stream per predetermined transmissionand to transmit said receiving playback equipmentIt has a receive sectiona buffer parta cash advance disk parta regenerating sectionand a control sectionA continuous-media in-stream playback system by which a means of (k) being included below from (a)(a) A number set of contents of said continuous-media stream which should be reproduced. A means and the (b) aforementioned cash advance disk part which specify (it is hereafter called a reproduction set) are searchedIt is a number set of contents stored in said cash advance disk part in said reproduction setAnd in a means and the (c) aforementioned playback set which specify a number set (it is hereafter called a disk set) although not stored in said buffer part yeta means to specify a number set (it is called a reception set below) of what is a number set of contents which are not contained in said disk setneeds to send a Request to Send to said sending setand needs to receive with said receiving playback equipmentand (d) -- in said playback setIt is a number set of contents which are not contained in said disk setA means to specify a set (it is hereafter called a write-in set) which should be written in a cash advance disk part(e) A means to send a Request to Send to young numerical order in said reception set at said sending set(f) A means to receive contents of said demanded reception set in said receive sectionand to store in said buffer part(g) A means to reproduce contents stored in said buffer part sequentially from a young thing of a number in said reproduction set(h) A means which writes contents stored in said buffer part in young numerical order in said write-in set at said cash disk part(i) If there are a means to carry out to read contents from said cash disk part to young numerical orderand to store in it in said disk set at said buffer parta buffer (j) playedand a written in bufferA means repeated until it is parallelit performs operation from a means to clear and to open to receptionand the (k) aforementioned means (e) to (j) and said reproduction set and a write-in set become empty.
[Claim 2]It is a system reproduced while receiving playback equipment receives a continuous-media stream which lets a transmission line pass and is transmitted from a sending setHave said sending set and a means to divide said continuous-media stream per predetermined transmissionand to transmit said receiving playback equipmentHave a receive sectiona buffer parta regenerating sectionand a control sectionand said buffer part has two or more buffersSaid each buffer has a buffer numberan identifierand contents at leastA continuous-media in-stream playback system by which a means of (g) being included below from (a)(a) A means to specify the range of said continuous-media stream which should be reproduced with a user's directions(b) Send a Request to Send of the range of said continuous-media stream to said sending setAre a means to receive with said receiving playback equipmentand

contents which carried out the (c) aforementioned reception a means written in a buffer partand this meanssaid buffer number being young and writing in an identifier which shows that they are said contents which receivedand a full buffer to an empty buffer of said buffer part in order of circulation -- (d) -- it being a means to reproduce contents of said buffer partand said buffer number being young and this means in order of circulationReproduce contents stored in a full buffer of said buffer partand contents of said full buffer of said reproduced buffer part are clearedA means repeated until reproduction of a range which wrote in an identifier which shows that it is an empty bufferand processed the (e) means (c) and (d) in paralleland as which a specified continuous-media stream was specified is completed.

[Claim 3]A means which writes said contents which received in a buffer partThe continuous-media in-stream playback system according to claim 2 including interrupting reproduction when a means to interrupt writing and to reproduce contents of said buffer part when said empty buffer cannot be found does not have said full buffer [Claim 4]A systemwherein a means to be a system given in claims 1 and 2and to send said Request to Send to said sending set sends said Request to Send to said sending set independently of reproduction speed or a reproduction state further.

[Claim 5]A system which is the system according to claim 1 and is characterized by a number of bytes of contents of said transmitting unit being the same as that of contents of said buffer part including an identifier to which said transmitting unit of said continuous-media stream gave a number.

[Claim 6]A system which is the system according to claim 2 and is characterized by a number of bytes of contents of said transmitting unit being the same as that of contents of said buffer part.

[Claim 7]Are the system according to claim 1if there are a buffer reproduced [said] and a written in buffera means to clear and to open to reception is written in said cash advance disk partwhen there is no buffer wide opened further for receptionbut. A system by which a means for said buffer to be clearedand for said buffer which opens wide and corresponds to reception to clear a buffer of a maximum number in them with pluralityand to open to reception being included if there is a buffer which is not reproduced.

[Claim 8]A means to reproduce contents which are the systems according to claim 1 and are stored in said buffer partA system by which a means which plays another contents beforehand stored in said cash disk part being included when specified contents are not stored in said buffer part.

[Claim 9]Are the system according to claim 1 and in reception regeneration of consecutive stream data each buffer of said buffer partA write-in buffer when stored in a receive buffer which stores said contents which receivedand said cash advance disk at leastA read-out buffer which stores buffer data read from said cash advance diska regeneration buffer for playingan empty buffer cleared after playbackand a

system considering it as a full buffer in which contents are storedand operating.
[Claim 10]Are the system according to claim 1 and said buffer partA system by which said contentssaid stream numbera NARU identifier that shows that it is an empty buffera write-in identifier which writes in said cash advance disk and shows that it is endingand a playback identifier which shows that it is ending with playback being included at least as a component.
[Claim 11]It is the method of reproducingwhile receiving playback equipment receives a continuous-media stream which lets a transmission line pass and is transmitted from a sending setHave said sending set and a means to divide said continuous-media stream per predetermined transmissionand to transmit said receiving playback equipmentIt has a receive sectiona buffer parta cash advance disk parta regenerating sectionand a control sectionA consecutive media stream reproduction method by which a step of (k) being included below from (a)(a) A number set of contents of said continuous-media stream which should be reproduced. A step and the (b) aforementioned cash advance disk part which specify (it is hereafter called a reproduction set) are searchedIt is a number set of contents stored in said cash advance disk part in said reproduction setAnd in a step and the (c) aforementioned playback set which specify a number set (it is hereafter called a disk set) although not stored in said buffer part yeta step which specifies a number set (it is called a reception set below) of what is a number set of contents which are not contained in said disk setneeds to send a Request to Send to said sending setand needs to receive with said receiving playback equipmentand (d) -- in said playback setIt is a number set of contents which are not contained in said disk setA step which specifies a set (it is hereafter called a write-in set) which should be written in a cash advance disk part(e) A step which sends a Request to Send to young numerical order in said reception set at said sending set(f) A step which receives contents of said demanded reception set in said receive sectionand is stored in said buffer part(g) A step which reproduces contents stored in said buffer part sequentially from a young thing of a number in said reproduction set(h) A step which writes contents stored in said buffer part in young numerical order in said write-in set at said cash disk part(i) If there are a step which reads contents from said cash disk part to young numerical orderand is stored in it in said disk set at said buffer part and to carry outa buffer (j) playedand a written in bufferA step repeated until it is parallelit performs processing from a step which is cleared and is opened to receptionand the (k) aforementioned step (e) to (j) and said reproduction set and a write-in set become empty.
[Claim 12]It is the method of reproducingwhile receiving playback equipment receives a continuous-media stream which lets a transmission line pass and is transmitted from a sending setHave said sending set and a means to divide said continuous-media stream per predetermined transmissionand to transmit said receiving playback equipmentHave a receive sectiona buffer parta regenerating sectionand a control sectionand said buffer part has two or more buffersSaid each buffer has a buffer

numberan identifierand contents at leastA consecutive media stream reproduction method by which a step of (g) being included below from (a)(a) A step which specifies the range of said continuous-media stream which should be reproduced with a user's directions(b) Send a Request to Send of the range of said continuous-media stream to said sending setAre a step received with said receiving playback equipmentand contents which carried out the (c) aforementioned reception a step written in a buffer partand this stepSaid buffer number is young and in order of circulation to an empty buffer of said buffer part. writing in an identifier which shows that they are said contents which receivedand a full buffer -- (d) -- it being a step which reproduces contents of said buffer partand said buffer number being young and this step in order of circulationReproduce contents stored in a full buffer of said buffer partand contents of said full buffer of said reproduced buffer part are clearedA step repeated until reproduction of a range which wrote in an identifier which shows that it is an empty bufferand processed the (e) step (c) and (d) in paralleland as which a specified continuous-media stream was specified is completed.

[Claim 13]A step which writes said contents which received in a buffer partThe consecutive media stream reproduction method according to claim 12 including interrupting reproduction when a step which interrupts writing and reproduces contents of said buffer part when said empty buffer cannot be found does not have said full buffer.

[Claim 14]A methodwherein a step which is a method given in claims 11 and 12and sends said Request to Send to said sending set sends said Request to Send to said sending set independently of reproduction speed or a reproduction state further.

[Claim 15]A method which is the method according to claim 11 and is characterized by a number of bytes of contents of said transmitting unit being the same as that of contents of said buffer part including an identifier to which said transmitting unit of said continuous-media stream gave a number.

[Claim 16]A method which is the method according to claim 12 and is characterized by a number of bytes of contents of said transmitting unit being the same as that of contents of said buffer part.

[Claim 17]Are the method according to claim 11if there are a buffer reproduced [said] and a written in buffera step which is cleared and is opened to reception is written in said cash advance disk partwhen there is no buffer wide opened further for receptionbut. A method by which a step which said buffer is clearedand said buffer which opens wide and corresponds to reception clears a buffer of a maximum number in them with pluralityand is opened to reception being included if there is a buffer which is not reproduced.

[Claim 18]A step which reproduces contents which are the methods according to claim 11 and are stored in said buffer partA method by which a step which plays another contents beforehand stored in said cash disk part being included when specified contents are not stored in said buffer part.

[Claim 19]Are the method according to claim 11 and in reception regeneration of consecutive stream data each buffer of said buffer partA write-in buffer when stored in a receive buffer which stores said contents which receivedand said cash advance disk at leastA read-out buffer which stores buffer data read from said cash advance diska regeneration buffer for playingan empty buffer cleared after playbackand a method of considering it as a full buffer in which contents are storedand operating.
[Claim 20]Are the method according to claim 11 and said buffer partA method by which said contentssaid stream numbera NARU identifier that shows that it is an empty buffera write-in identifier which writes in said cash advance disk and shows that it is endingand a playback identifier which shows that it is ending with playback being included at least as a component.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]About a system reproduced while receiving playback equipment receives the continuous-media stream transmitted from a sending setand a method for the samein detailIt is related with a reproducing system of the continuous-media stream transmitted via World Wide Web (World Wide Webfollowing WWW)and a method for the same.
[0002]
[Description of the Prior Art]In recent yearsproviding service of an audiovideoor its both has come to be performed via WWW. As a method of data communicationswhen it roughly dividesthere are a download system and a stream method. A download system is altogether downloadedbefore playing mediasuch as an audio or video. Although there is an advantage that this method does not influence reproductive quality even if the load of a transmission route is heavyConverselyit is mentioned that it is necessary to download allthat reproduction in real time cannot be performed furtheretc. to hear that it takes the time of downloadand a part of information as a fault. A stream method is reproduced one by onetransmitting a consecutive stream. When this method is requiredit has an advantagelike reproduction in the real time whose reproduction is possible promptly can be performedbut. Converselyas a faultit is mentioned that the server for that wide band width is required of a transmission linethat the gravity of the load of a transmission line influences the quality of a recycled article easilyand a flow control is required for a stream method etc.
[0003]The commercial scene is provided with many things which have adopted the stream method in conventional technology. These products are transmitting continuous mediasuch as an audio and videoon the Internet using continuous-media stream transmission art. As shown in drawing 1the user can play the contents of the

audio and video which are sent via the Internet using the receiving playback equipment (10) of a system. Two buffers (16) are used in such conventional technologies. One is a buffer for reception and other one is a buffer for reproduction. If the buffer for reception will be full (Fullfullfollowing full) and all the data of the buffer for reproduction will moreover be reproducedthese two buffers will be changed. Therebya continuation audio video stream is continuously renewable.

[0004]

[Problem(s) to be Solved by the Invention]Howeverin such conventional technologieswide band width was too required of the transmission lineand the problem of being easy to influence the quality of the continuous-media stream by which the gravity of the load of a transmission line is reproduced remains. In the Internetif access to a server from a user concentrates at oncethe load of a transmission line will become heavy and reduction of transmission band width will not be avoided. Thereforein conventional technologyit cannot respond flexibly to the instability of the Internet. It is a big problem that playbacks of a continuous-media streamsuch as musical playbackare not performed continuously. The purpose of this invention is to provide a cheap and easy system and a realization method for the same for reducing degradation of the quality of the continuous-media stream to reproduceeven if the gravity of the load of a transmission line occurs.

[0005]

[Means for Solving the Problem]This invention proposes a buffering caching method for a continuous-media stream as shown in drawing 2 and drawing 3 in order to attain said purpose. That iscontinuous media like an audio video are transmitted in a form of a stream using the Internetand receiving playback equipment reproduces media to continuation using a circulation buffer which consists of two or more buffersperforming synchronizing of access speed and reproduction speed. In operationfirstall the buffers are cleared and it is considered as "an empty buffer." One of them is received as a "receive buffer." If this "receive buffer" becomes fulldata in it will be stored in a disk and it will play simultaneously. Reception of a continuous-media stream is continued using a buffer as for which the next is vacant. If storing on a cash advance disk and playback of buffer data which are shown in drawing 4 finishthis buffer will be clearedand it will be considered as "an empty buffer"and will be again used as a "receive buffer."

[0006]In conventional technologyas shown in drawing 1a "receive buffer" and a "regeneration buffer" are being fixed in the same size. Size (sum of a "receive buffer" and all the "empty buffers") of a buffer actually used for reception in a method of a circulation buffer of the invention in this applicationSize (sum of a "regeneration buffer" and all the "full buffers") of a buffer used for reproduction changes dynamically according to reception and recovery status of a system rather than is necessarily the same. For examplesince the number of "full buffers" with which unreproduced contents are stored will increase if receiving speed becomes quicker

than reproduction speedsize of a buffer which can be used for reproduction becomes large. If reproduction speed becomes quicker than receiving speedthe number of "empty buffers" will increase. Since it is difficultreceiving speed becomes earlier than reproduction speedor it becomes late conversely to guarantee communication band width of the Internet over a certain time generally. The circulation buffer of the invention in this application can respond flexiblyeven if such a situation occursand it can cancel many problems generated with the instability of bandwidth of a transmission line of the Internet.

[0007]A user's operation may halt reproduction. At this timeall the buffers may become full. In a conventional methodit will wait until it stops reception and reproduction is resumed. In a method of the invention in this applicationcash of the "receive buffer" which became full can be carried out to a diska "receive buffer" can be vacatedand it can use for reception again. By thisit can carry out continuouslywithout halting receptioneven if reproduction has stopped. If playback is resumedit will become possible to resume playback of a stream promptly by reading contents stored in a diskwriting in "an empty buffer" and playing. By thistransfer capability of the Internet can be used for the maximum regardless of a gravity of load of the Internet. In the invention in this applicationas long as capacity of a transmission line allows regardless of reproduction speeda receive section receives contents played later and stores in a disk.

[0008]

[Embodiment of the Invention]

[Example 1] Drawing 2 is a block diagram showing the outline of the invention in this application. The main components of the invention in this application are explained. As main componentsthere are a sending set (200)a data transmission line (180)and receiving playback equipment (100). There are a transmission section (222)a send data storage (232)an I/F part (212)etc. in a sending set (200). It omits about a component unnecessary to explanation of the invention in this application. A transmission section (222) transmits the continuous-media stream read from the send data storage (232) according to the demand from receiving playback equipment (100) via an I/F part (212). At this timea transmission section (222) divides and transmits to the transmitting unit according to the rule decided beforehand. Although a data transmission line (180) is a communication line etc. which transmit datait is WWW in this example.

[0009]An I/F part (110)a receive section (120)a buffer part (130)a cash advance disk part (140)a regenerating section (150)a controller part (170)a user input part (160)etc. are contained in receiving playback equipment (100). The continuous-media stream (400) shown in drawing 5 is transmitted from a sending set (200). The contents of the continuous-media stream (400) received via the I/F part (110) are stored in a buffer part (130). At this timea continuous-media stream (400) is stored for every transmitting unit. A regenerating section (150) begins to read the contents of the

continuous-media stream stored in the buffer part (130) one by oneand is reproduced. These unreproduced contents are stored in a cash advance disk part (140). If the unreproduced contents stored in the cash advance disk part (140) become the timing reproducedthey will be returned to a buffer part (130) and will wait for reproduction. Receiving playback equipment (100) sends the Request to Send of the stream reproduced later to a sending set (200)as long as the circuit band of a data transmission line allows regardless of reproduction speed.

[0010]Drawing 3 shows the buffer part (130) built in receiving playback equipment (100). A buffer part including at least seven buffers each bufferBy the timing usedit operates as a "receive buffer" (210)a write-in buffer(230)a "read-out buffer" (240)a "regeneration buffer" (250)an empty buffer(220)and a "full buffer" (245). In Example 1the buffer after receptionthe buffer after writingand the buffer after read-out are called a "full buffer" in the meaning that unreproduced contents are stored. At least two pieces are required for "an empty buffer" because of a "receive buffer" and a "read-out buffer." When having received and the writing to one a "receive buffer" is completedwriting must be promptly started to the following "receive buffer." While reading similarlywhen the writing to one a "read-out buffer" is completedthe writing to the following "read-out buffer" must be started promptly.

[0011]The regenerating section (150)the receive section (120)and the cash advance disk part (140) are connected with these seven buffers via the data bus (260)respectively. On account of explanationthe inside of a buffer part is called a "receive buffer"a "regeneration buffer"a "read-out buffer"a write-in buffera "full buffer"and "an empty buffer"and is explained. In practiceit is the same buffer physically. When performing the invention in this applicationeven if it was the same buffer physicallysince each buffer changed the role by the timingsuch a term was used for it. That iswhen having receivedit operates as a "receive buffer"and when reproducedit operates as a "regeneration buffer."

[0012]A buffer part consists of two or more buffer data (300). Drawing 4 shows the component of each buffer data. The contents reproduced as a continuous-media stream are stored in a contents part (310). The identification number given to the continuous-media stream is stored in a stream number part (350). It means that the reproduction identifier part (340) has already reproduced a buffer being vacant and storing that it is not a buffer in a write-in identifier part (330) at the cash advance disk part (140) in being written in "1"respectively to a NARU identifier part (320). The reverse is meant when "0" is written in. A stream number and contents are stored in a cash advance disk part among these buffer data (300).

[0013]Drawing 5 is a figure showing the continuous-media stream (400) reproduced. A continuous-media stream (400) is divided in the same size as the size of the contents (310) of buffer data (300)and the stream number (410) is attached in order. This divided portion is a transmitting unit transmitted from a sending set (200). As an example of a continuous-media stream (400)when the audio stream of 8-bit

PCM11kHz is taken upa number of bytes required in order to reproduce the stream for about 5 minutes is about 3.14 M bytes. In this example8192 bytes was taken as size of a buffer. Thereforethe total of a consecutive stream serves as 403 (=3.14 x 1024 x 1024/8.192+2) individuals. Hereafterthe algorithm of the invention in this application is explainedreferring to drawing 7 A to drawing 7 F. Drawing 7 A shows the flow chart of the whole in Example 1. After a user inputit operates as parallel processing of each processing of a receiving stepa write-in stepregeneration stepsa read-out stepand a clear step is carried out.

[0014](1) A user input step (drawing 7 A) (a) user inputs the kind of media to reproduce from a user input partthe rangethe number of the buffers to be usedand other information. A controller part specifies a number set (on this application specificationsit is called "a reproduction set" below) of the contents of a continuous-media stream required for reproduction.

(b) it is a number set of the contents which search a cash advance disk part and are stored in the cash advance disk part in "the playback set"and is not stored in the buffer part -- specify a number set (it calls the following "a disk set") of a thing.

(c) In "playback set"it is a number set of the contents which are not contained in "the disk set"and a Request to Send is sent to a sending setand a number set (it calls the following "a reception set") of what needs to receive with receiving playback equipment is specified.

(d) In "playback set"it is a number set of the contents which are not contained in "the disk set"and the set (it calls the following "a write-in set") which should be written in a cash advance disk part is specified.

[0015](2) Receiving step (drawing 7 B)

(a) The Request to Send of contents is sent to young numerical order in "reception set" at a sending set.

(b) Contents are received by making "opening buffer" into a "receive buffer."

The contents > contents part (310) which received

(c) The following information is written in "receive buffer" and it becomes a "full buffer." A "full buffer" waits for the regeneration or the write-in processing which is the next processing.

Stream number -- > stream number part (350)

1which a buffer is vacant and shows that it is not a buffer -- > NARU identifier part (320)

(d) The number of the contents concerned by which "reception set" was received is deleted from "a reception set."

[0016](3) Regeneration steps (drawing 7 C)

(a) Sequentially from the young thing of a numbera reproduction identifier looks for the "full buffer" which is "0" in "reproduction set."

(b) Reproduce the contents stored in it by making the detected "full buffer" into a "regeneration buffer."

(c) The following information is written in "regeneration buffer."
finishing [reproduction] -- it is -- "1" which shows things -- > reproduction identifier part (340)
(d) The number of the contents concerned by which "reproduction set" was reproduced is deleted from "a reproduction set."
(e) When there is "no full buffer" which stores the specified contentssink below the popular contents (for examplea hot newsa weather reportetc.) stored in the cash disk part to a stream beforehandand continue playback. Howeverif the specified contents are received and it is stored in a bufferreproduction of the contents which interrupted will be stopped and reproduction of the original contents will be resumed by making this "full buffer" into a "regeneration buffer."
[0017](4) A write-in step (drawing 7 D)
(a) In young numerical ordera write-in identifier looks for the "full buffer" which is "0" in "write-in set."
(b) Use the detected "full buffer" as "a write-in buffer"and write contents and a stream number in a cash disk part among the information stored in it.
(c) The following information is written in "write-in buffer."
1which writes inends and shows a certain thing -- > write-in identifier part (330).
(d) The number of the contents concerned in which "write-in set" was written is deleted from "a write-in set."
(5) Read-out step (drawing 7 E)
(a) It searches in young numerical order in "disk set."
(b) "opening buffer" is used as a "read-out buffer"the contents and the stream number which were detected are read from a cash disk partand it stores in this "read-out buffer."
The read contents > contents part (310)
(c) The following information is written in "read-out buffer"and it is considered as a "full buffer."
Stream number -- > stream number part (350)
1which a buffer is vacant and shows that it is not a buffer -- > NARU identifier part (320)
finishing [writing] -- it is -- "1" which shows things -- a > write-in identifier part (330).
(e) The number of the read contents [concerned] of "disk set" concerned is deleted from "a disk set."
[0018](6) Buffer clearance step (drawing 7 F)
(a) In "full buffer"if it is written in a cash advance disk part and there is a buffer which is ending with reproductionthe contents and stream number will be clearedthe following information will be written inand it will be considered as "an empty buffer."
0which shows that it is "an empty buffer" -- > NARU identifier part (320)
0which shows that it has not reproduced -- > reproduction identifier part (340)

unwritten in **** -- "0" which shows things -- a > write-in identifier part (330)
(b) If there is "full buffer" which is not reproduced although written in the cash advance disk part when there is no "opening buffer"the contents and stream number will be clearedthe following information will be written inand it will be considered as "an empty buffer."
0which shows that it is "an empty buffer" -- > NARU identifier part (320)
0which shows that it has not reproduced -- > reproduction identifier part (340)
unwritten in **** -- "0" which shows things -- a > write-in identifier part (330)
The number of the contents concerned which became the "empty buffer" concerned here is added to "a disk set." Applicable "full buffer" writes in the following information to the "full buffer" of the maximum [stream number] in them with pluralityand considers it as "an empty buffer."
0which shows that it is "an empty buffer" -- > NARU identifier part (320)
0which shows that it has not reproduced -- > reproduction identifier part (340)
unwritten in **** -- "0" which shows things -- a > write-in identifier part (330)
The number of the contents concerned which became the "empty buffer" concerned here is added to "a disk set."
(7) Get it blocked until it satisfies a terminating conditionand repeat from a step (1) to (6) until "a reproduction set" and "a write-in set" become empty.
[0019]As shown in drawing 7 Arepeat execution of (6) is carried out from a step (1)and it operates as parallel processing of each processing of a receiving stepa write-in stepregeneration stepsa read-out stepand a clear step is carried out. The following effects are expectable by processing a receiving stepa write-in stepregeneration stepsa read-out stepand a clear step in parallel. That iswhen a transmission line has a marginthe stream played regardless of reproduction speed later can be receivedand it can store in a disk. When the user has interrupted playback temporarilyalsofor example in the time of pause (Pause)the stream played later also receives and it stores in a disk. Thereforeeven when it becomes an overload while reproducing the transmission linethe stream stored beforehand is read from a disk and a quality continuous-media stream can be played. In conventional technologyeven when a transmission line has a margin even ifonly a stream required for reproduction can receive then. Converselywhen a transmission line becomes an overloadthe quality of a continuous-media stream will fall off promptly.
[0020]On the other handif the state where the load of a transmission line is heavy continues for a long timeall the buffers may become empty. In this casein the conventional methodreproduction is interruptedand it will wait until contents are written in a "receive buffer." In the invention in this applicationit sinks below the popular contents (for examplea hot newsa weather reportetc.) by which cash was beforehand carried out to the disk to the present streamand plays. Reception is continued also in the meantimeif the contents which should be reproduced essentially which the user specified to some extent are accumulatedinterruption of popular

contents will be stopped and reproduction of original contents will be continued. When all the buffers become empty againinterruption of popular contents is resumed. By repeating and performing such interruptiona soundless state can be abolished and the quality of the service to provide can be improved.

[0021]The user can specify various parameters which control operation further. For examplethe contents after playback are stored in a diskor there are restriction of the disk storage capacity which is thing-specified and is used which is not carried outspecification of the information played at the time of discontinuationetc. When the mode in which the contents which received are stored in a disk is chosen and continuous-media stream data are stored in a diskit cannot be overemphasized that operation of playback for the second timea rapid traverserewindingetc. can be performed immediately.

[0022]

[Example 2] There are some which removed the cash advance disk part (140) as other examples from the composition shown in Example 1. Drawing 9 is a figure showing the internal structure of the buffer part in Example 2. The receive buffer (610)the regeneration buffer (620)the full buffer (640)and the empty buffer (630) are shown. Eight buffers are used in Example 2. The size of the contents of each buffer is 8192 bytes. As an example of a continuous-media streamif the audio stream of 8-bit PCM 11kHz is taken uppreservation for about 0.7 second can be performed with the buffer of a piece. Thereforewith eight empty buffersthe voice data of about 5.6 (=0.7x8) second can be saved. A user can specify the maximum number of the buffer to be used arbitrarily. Since it can increase a buffer by within the limits specified by a usereven if this application system has a gravity of the load of a transmission routeit can respond flexibly.

[0023]Drawing 8 shows the component of the buffer data (500) in Example 2. The buffer data (500) in Example 2 comprise a contents part (510)a state identifier part (520)and a buffer number part (530). In order to show that "0" is a full buffer in order the buffer concerned is vacant and to show that it is a buffer1is written in a state identifier part (520). The number the buffer which has (530) in reproduction and a receiving set was numbered is stored in a buffer number part. In Example 2since eight buffers are usedit has buffer data which have the buffer numbers from zero to seven. Drawing 10 A shows the flow chart in Example 2. The size (sum total of a "regeneration buffer" and all the "full buffers") of the buffer used for reproduction changes dynamically according to the situation of a system rather than is necessarily the same as the size (sum total of a "receive buffer" and all the "empty buffers") of the buffer actually used for reception. For exampleif receiving speed becomes quicker than reproduction speedthe number of the "receive buffers"i.e.a "full buffer"which became full will increase. If reproduction speed becomes quicker than receiving speedthe number of buffersi.e.an empty buffercleared by ending with reproduction increases. Hereafterthe algorithm of Example 2 is explainedreferring to drawing 10 A

to drawing 10 C.
[0024](1) A user input step (drawing 10 A) (a) user inputs the kind of media to reproduce from a user input partthe rangethe number of the buffers to be usedand other information. A controller part specifies a continuous-media stream required for reproductionand its range.
(2) Send the Request to Send of the contents of the range as which the continuous-media stream by which Request-to-Send step (a) specification was carried out was specified to a sending set. The transmitting unit of the contents transmitted from a sending set is the same as the size of the contents part of a "receive buffer" like Example 1.
[0025](3) Receiving step (drawing 10 B)
(a) Look for the buffer which has a number with more one than the buffer number of the buffer which wrote in the contents which received last time. Howeverif a buffer number goes to the greatest buffer numberthe buffer which has the minimum buffer number will be looked for. In Example 2if it goes to (7) which is the greatest buffer number(0) which is the minimum buffer number will be looked for.
(b) If the buffer concerned is "an empty buffer"it will be made into a "receive buffer" and the demanded contents will be received.
The contents > contents part (510) which received
(c) The following information is written in "receive buffer" and it is considered as a "full buffer." "1" which shows that it is a full buffer -- > state identifier part (520)
(d) When the buffer concerned contains unreproduced contentswait until it interrupts reception and the buffer concerned turns into "an empty buffer" (when a state identifier is "1").
[0026](4) Regeneration steps (drawing 10 C)
(a) Look for the buffer which has a number with more one than the buffer number of the buffer containing the contents reproduced last time. Howeverif a buffer number goes to the greatest buffer numberthe buffer which has the minimum buffer number will be looked for. In Example 2if it goes to (7) which is the greatest buffer number(0) which is the minimum buffer number will be looked for.
(b) If the buffer concerned is a "full buffer"it is made into a "regeneration buffer"and contents will be read from there and it will reproduce.
(c) Clear the contents of the reproduced bufferwrite the following information in itand consider it as "an empty buffer."
0which shows that it is an empty buffer -- > state identifier part (520)
(d) When reproduction contents are not stored in the buffer concernedwait until it interrupts reproduction and unreproduced contents are written in the buffer concerned (when a state identifier is "0").
(5) Repeat until reproduction of the range as which it was parallel and the specified continuous-media stream was specified ends Step (2) and (4).
[0027]

[Effect of the Invention]Drawing 6 B shows the transmitting situation of contents [in / in this application / an invention]. In the invention in this applicationas long as the capacity of a transmission line allows regardless of reproduction speeda receive section receives the contents played later and stores in the disk. It is the same even when a user points to a halt. Drawing 6 A shows the transmitting situation of the contents of conventional technology. In conventional technologyeven if the capacity of a transmission line has a marginonly a then required thing is transmitted. Transmission of contents is interrupted when a user points to a halt. Thereforethe invention in this application can reduce degradation of the quality of a reproduction medium resulting from the instability of the transmission line of the Internetwhen reproducing continuous mediasuch as an audio video in the Internet.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing conventional technology.
[Drawing 2]It is a block diagram showing the preferred embodiment of this invention.
[Drawing 3]It is a figure showing the buffer part of Example 1 of this invention.
[Drawing 4]It is a figure showing the buffer data of Example 1 of this invention.
[Drawing 5]It is a figure showing the consecutive stream of Example 1 of this invention.
[Drawing 6 A] It is a figure showing the data-communications state in conventional technology.
[Drawing 6 B] It is a figure showing a data-communications state by that of this invention.
[Drawing 7 A] It is a flow chart about the preferred embodiment 1 of this invention.
[Drawing 7 B] It is a detail flowchart about the preferred embodiment 1 of this invention.
[Drawing 7 C] It is a detail flowchart about the preferred embodiment 1 of this invention.
[Drawing 7 D] It is a detail flowchart about the preferred embodiment 1 of this invention.
[Drawing 7 E] It is a detail flowchart about the preferred embodiment 1 of this invention.
[Drawing 7 F] It is a detail flowchart about the preferred embodiment 1 of this invention.
[Drawing 8]It is a figure showing the buffer data of Example 2 of this invention.
[Drawing 9]It is a figure showing the buffer part of Example 2 of this invention.
[Drawing 10 A] It is a flow chart about the preferred embodiment 2 of this invention.
[Drawing 10 B] It is a detail flowchart about the preferred embodiment 2 of this

invention.
[Drawing 10 C] It is a detail flowchart about the preferred embodiment 2 of this invention.
[Description of Notations]
100: Receiving playback equipment
110: I/F part
120: Receive section
140: Cash advance disk part
130: Buffer part
150: Regenerating section
170: Controller part
160: User input part
180: Data transmission line
200: Sending set
220: Transmission section
230: Send data storage
212: I/F part
222: Transmission section
232: Send data storage
210610: Receive buffer
220630: An empty buffer
230: A write-in buffer
240: Read-out buffer
245640: Full buffer
250620: Regeneration buffer
260650: Data bus
300500: Buffer data
310510: Contents part
320: NARU identifier part
330: A write-in identifier part
340: Reproduction identifier part
350: Stream number part
400: Continuous-media stream
410: Stream number
520: State identifier
530: Buffer number part